Space Weather Forecast

Issued on Friday, 19 July 2024 at 13:07 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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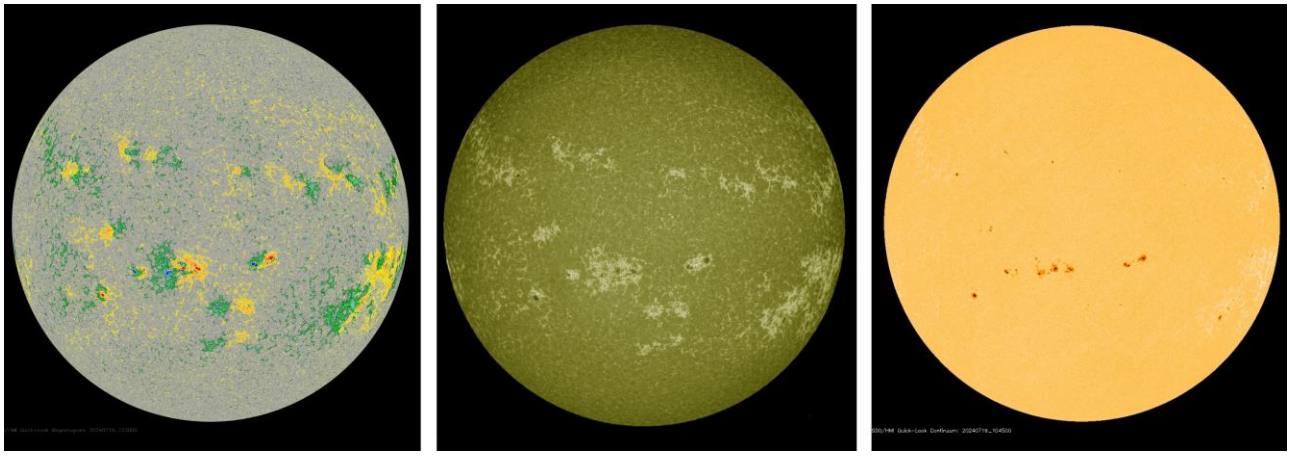
Space Weather Forecast Headline: Moderate-class X-ray flares likely. Minor Geomagnetic Storm G1 becoming likely Saturday 20 July.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been Moderate, with a peak Moderate-class X-ray flare at 19/0823UTC from AR3753 in the northwest of the facing side of the Sun. There are now up to 18 sunspot regions, which is anecdotally a (roughly decade-spanning) record for this author, and the figure has been tentatively as high as 19 in the past 24 hours. This number included a number of magnetically simple high solar latitude regions, perhaps more akin to an early-solar cycle Sun, although their sheer quantity was more like a solar maximum disc. Many of the main changes in the past 24 hours have occurred in the central portion of the disc near 10 South, with the largest and most complex group here showing areal growth and proliferation in its trailing spots. Also of note were a region to its immediate west, which also grew areally and showed a spreading tendency, while a third new region developed near 25 East. Other main regions lay nearer the western solar horizon and all went through phases of proliferation of spots in the past day.

Figure 1: Suite of images from the hour of 19/1000UTC, respectively: false-colour imagery showing magnetic polarities of regions, flase colour near-infrared imagery showing the sunspots and their surrounding 'plages', and the Sun in visible light - all showing the 'scattershot' facing side at present.



No Earth-directed Coronal Mass Ejections (CMEs) have been observed in available satellite imagery - a 'coronal dimming' following a small south-central Common-class flare around 18/2200UTC could not be tied to any obvious subsequent CME. A possible 'filament eruption' (arc of plasma leaving the Sun) occurred in the far northwest around 19/1100UTC - imagery for this event is awaited.

Solar Wind / Geomagnetic Activity: The solar wind speed was reflective of a slow regime, with

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all solar wind measures within their typical background ranges. The net result of these solar wind measures was provisionally quiet geomagnetic activity throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate-class flares remain likely through this period, with a slight chance of Strong-class. Several sunspot regions are due to arrive and depart in the four days, and although some volatility is therefore possible risks are held roughly constant for now.

Solar Wind /Geomagnetic Activity: Up to two CMEs feature in the forecast, with both emitted on 16 July and due at Earth very late in the current UTC day or more likely into Saturday 20 July. G1/Minor Geomagnetic Storms are likely as a result. No significant fast winds otherwise feature, and the geomagnetic forecast should return to quiet into the new UTC working week.

Energetic Particles / Solar Radiation: There is a daily slight chance of solar radiation levels rising above the S1/Minor Storm threshold in response to any notable flares in the period. The current UTC morning's Moderate class flare is now not thought to pose any additional risk in the immediate term (for too many hours having elapsed since its occurrence).

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	60	20	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	70	70	70	70
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	10	10	10	15
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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